Appendix D - NTETC Grain Moisture & NIR Protein Sectors
September 1999 Meeting Summaries

National Type Evaluation Technical Committee
Grain Moisture Meter (GMM) Sector
September 8-9, 1999 St. Louis, MO
Meeting Summary

Agenda Items

*1. Election of Sector Chairperson
2. Proposed Test Weight per Bushel Criteria for Section 5.56(a) of NIST Handbook (HB) 44
3. Proposed Change to Publication 14 - Use of Manufacturer Supplied Data in NTEP Calibration Updates
4. Review of Evaluation Procedure Outlines (EPOs) and Test Procedures for the Field Evaluation of GMM Devices
5. Update on the Status of the Interagency Agreement for Funding the Ongoing Calibration Program (OCP)
6. Update on NTEP Type Evaluation and OCP (Phase II) Testing
7. Status of NTEP Meters in the Field - Review of Data from State Inspections
8. Process for Making Midyear Changes to NTEP GMM Certificates of Conformance
9. Fees for NTEP Applications and Evaluation of Grain Moisture Meters (Phase I)
*10. Update on the Structure of NCWM and the Organization of NTEP
11. Report on the 1998 NCWM Annual Meeting and the 1999 NCWM Interim and Annual Meetings
*12. Time and Place for Next Meeting

Note: Because of common interest, items marked with an asterisk (*) were considered in joint session of the NIR Grain Analyzer and the Grain Moisture Meter Sectors.

1. Election of Sector Chairperson

Richard (Will) Wotthlie, Maryland Weights and Measures, was re-elected to the post of Chairperson for both the Grain Moisture Meter Sector and the Near Infrared Grain Analyzer Sector by unanimous vote of those present. Under the rules adopted by the Sector in March of 1996, he will serve for a 3-year term or until a successor is elected.

2. Proposed Test Weight per Bushel Criteria for Section 5.56(a) of NIST Handbook 44

Background: There are at least two NTEP Grain Moisture Meters which have the capability to automatically provide an indication and recorded representation of test weight per bushel (TW). Because of unrealistic tolerances in the existing Code, the TW indications of GMMs are typically not allowed to be used for commercial transactions. For this reason manufacturers of GMMs have programmed their devices to either display or record words such as "approx.", "approximate", or "estimated" by the TW reading when the TW feature is enabled. Enforcement varies from state to state. Some do not allow moisture meters with TW capability to display TW. Others allow "approximate" TW to be displayed, but require that a notice be posted on the meter to the effect that the TW indication is an approximation and is not approved for determining discounts. Since March 1996, the Sector has had many discussions on the criteria for TW in NIST HB 44. Several presentations were given on the current standard and on other standards used for this measurement. At its September 1997 meeting, the Sector agreed that priority should be given to drafting changes to the Grain Moisture Meter Code to specify field test methods and reasonable tolerances. At its March 1998 meeting, the Sector reviewed a draft of proposed changes to the Code which was subsequently sent out for letter ballot. In response to Committee Ballot 84-03 to add the proposed changes to NIST HB 44, Section 5.56(a), most of the Sector members agreed with the need for criteria but were not in agreement with the tolerances as proposed. The results of the ballot were as follows:

Affirmative	Affirmative (but disagree with tolerances)	Negative	Abstain
6	2	7	1

Discussion: One member suggested that the Sector might need to look at the tolerance issue more broadly, with a separate standard covering automatic test weight per bushel (TW) devices with tolerances targeted to the needs of the application. It was noted that the Grain Inspection, Packers and Stockyards Administration (GIPSA) would soon be evaluating a prototype automatic TW apparatus which might have tolerance requirements more stringent than moisture meters could achieve. Another member was of the opinion that, to be acceptable to the trade, TW performance tolerances would have to be the same for both stand-alone automatic TW devices and moisture meters with TW capability. It was also pointed out that it would be much easier to add to the Grain Moisture Meter (GMM) code than to develop separate code. If required, the development of separate code for stand-alone automatic TW apparatus could be considered later.

Dr. Richard Pierce, GIPSA, presented repeatability data for the official TW apparatus based on two TW values collected on each moisture sample during the 1998 Phase II On-going Calibration Program (OCP). Data summarizing GIPSA system-wide TW using the official TW apparatus was also presented. These data suggested that the tolerance groups to which some of the grain types had been assigned should be reconsidered. The Sector agreed that three tolerance groups would be sufficient. Corn and oats would be assigned to the group with the largest tolerance; all classes of wheat would be assigned to the group with the smallest tolerance; and soybeans and all other NTEP grains/oil seeds would be placed in the middle tolerance group.

After lengthy discussion, tolerances of ±0.8 pounds per bushel for corn and oats; ±0.5 pounds per bushel for all classes of wheat; and ±0.7 for soybeans, barley, oats, rice, sunflower, and sorghum were proposed for further study. Although several members opposed adopting the proposed tolerances and groupings for the following reasons: 1) difficult to meet the proposed tolerance for wheat; 2) difficult to obtain samples for field test; and 3) not discriminating enough for corn, they agreed to consider them for further study.

A number of enforcement issues were raised by some of the Sector's W&M members:

- Assuming that the proposed changes are adopted, and that a model is NTEP approved for TW, if a device of that same model passes a field test for moisture, but fails the field test for TW, can it be used for moisture if the TW feature is turned off?

- Will GMM's manufactured or placed in service after January 1, 1998 but prior to the adoption of the proposed changes, be allowed to continue to display (or record) an "approximate" or "estimated" TW for batching or screening purposes?

- The proposed change applies only to Sec. 5.66(a). Should pre-NTEP meters and those manufactured or placed in service before January 1, 1998 be allowed to continue to display an "approximate" or "estimated" TW?

Although these enforcement issues are up to individual jurisdictions to decide, several possible scenarios were suggested assuming that the proposed changes are adopted and that at least one GMM is NTEP approved for TW:

- For all jurisdictions:
  GMMs which are NTEP approved for TW shall not display or record any words indicating that the TW is "approximate" or "estimated", and they must pass the field inspection tolerance tests.

  A GMM of the same type as one which is NTEP approved for TW, but which was manufactured or placed in service before type approval was received for TW, should not be allowed to display "approximate" or "estimated". If the TW feature is to be used , the device should be returned to the manufacturer for up-grading, and it must pass the field inspection tolerance tests.

- For jurisdictions allowing the continued use of "approximate" TW:
  For GMMs which do not have NTEP approval for TW (regardless of date of manufacture):

If allowed to be used for TW, the recorded TW indication should indicate that the TW is "approximate" or "estimated", and a notice should be posted on the meter to the effect that the TW indication is an approximation not approved for determining discounts.

- For jurisdictions that never allowed the use of "approximate" TW:
  Only devices which are NTEP approved for TW are allowed to display or record TW, and they must pass the field inspection tolerance tests.

- For jurisdictions ending the use of "approximate" TW:
  If enforcement is made retroactive, they may have to address questions from elevators previously allowed to use "approximate" TW for screening or batching information . On the other hand, if enforcement is applied only to devices manufactured or put into service after the proposed code changes are adopted, buyers of new devices which have not been NTEP approved for TW may question why neighboring elevators are allowed to continue to use an older device of that type for TW.

To give manufactures a better idea how the proposed code might be applied when it came to type approval, a subcommittee was formed to draft additions to the test procedures and checklist of NCWM Publication 14 for the evaluation of GMMs incorporating test weight per bushel capability. The subcommittee was asked to have a draft ready for consideration by the Sector at its next meeting. The individuals expressing a desire to serve on this subcommittee included:

John Barber	JB Associates - GMM Sector Technical Advisor
Randy Burns	Arkansas Bureau of Standards
Cassie Eigenmann	DICKEY-john Corp.
Charles Hurburgh	Iowa State University, Agricultural Extension Service
Angelo Losurdo	Seedburo Equipment Co.
Richard Pierce	GIPSA, representing the NTEP Laboratory

Several State Sector members agreed to conduct a field evaluation to further evaluate the proposed tolerances and test methods. Dr. Hurburgh agreed to draft a form and develop the protocol for this field evaluation. A report of the field test results will be presented to the Sector for review at its next meeting. States which agreed to participate included:

Arkansas	North Carolina
Illinois	Maryland
Nebraska (tentative)	Missouri

Conclusion: The Sector concluded that it was premature to recommend that the National Conference adopt the proposed changes as part of the GMM code. However, the Sector considered the matter of sufficient importance to recommend that it be submitted to the Central Weights and Measures Meeting and the Southern Weights and Measures Meeting for consideration as an item for development so it can appear on the Conference's Interim Agenda. The proposed changes are shown below:

Proposed Test Weight per Bushel Criteria for Section 5.56(a) of Handbook 44

A. Application

A.1. This code applies to grain moisture meters; that is, devices used to indicate directly the moisture content of cereal grain and oil seeds. The code consists of general requirements applicable to all moisture meters and specific requirements applicable only to certain types of moisture meters. Requirements cited for "test weight per bushel" indications or recorded representations are applicable to devices incorporating an automatic test weight per bushel measuring feature.

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S. Specifications

S.1. Design of Indicating, Recording, and Measuring Elements.

S.1.1. Digital Indications and Recording Elements.

(a) Meters shall be equipped with a digital indicating element.

(b) The minimum height for the digits used to display moisture content shall be 10 mm.

(c) Meters shall be equipped with a communication interface that permits interfacing with a recording element and transmitting the date, grain type, grain moisture results, test weight per bushel results and calibration version identification.

(d) A digital indicating element shall not display, and a recording element shall not record, any moisture content values or test weight per bushel values before the end of the measurement cycle.

(e) Moisture content results shall be displayed and recorded as percent moisture content, wet basis. Test weight per bushel results shall be displayed and recorded as pounds per bushel. Subdivisions of ~~this~~ these units shall be in terms of decimal subdivisions (not fractions).

(f) A meter shall not display or record any moisture content or test weight per bushel values when the moisture content or test weight per bushel of the grain sample is beyond the operating range of the device, unless the moisture and test weight representations includes a clear error indication (and recorded error message with the recorded representation).

(g) On multi-constituent or multi-property meters (e.g., meters which also measure test weight per bushel or grain protein), provision shall be made for displaying and recording the constituent or property label (such as moist, protein, etc.) to make it clear which constituent or property is associated with each of the displayed and recorded values.
(Added 1995)

(Added 1993)(Amended 1994 and 1995)

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S.1.3. Operating Range. - A meter shall automatically and clearly indicate when the operating range of the meter has been exceeded. The operating range shall specify the following:

(a) Temperature Range of the Meter
The temperature range over which the meter may be used and still comply with the applicable requirements shall be specified. The minimum temperature range shall be 10 °C to 30 °C. No moisture value may be displayed when the temperature range is exceeded. An appropriate error message shall be displayed when the temperature of the meter is outside its specified operating range.

(b) Temperature Range of each Grain or Seed
The temperature range for each grain or seed for which the meter is to be used shall be specified. The minimum temperature range for each grain shall be 0 °C to 40 °C. No moisture value may be displayed when the temperature range is exceeded. An appropriate error message shall be displayed when the temperature of the grain sample exceeds the specified temperature range for the grain.

(c) Moisture Range of the Grain or Seed
The moisture range for each grain or seed for which the meter is to be used shall be specified. A moisture value may be displayed when the moisture range is exceeded if accompanied by a clear indication that the moisture range has been exceeded.

(d) Maximum Allowable Meter/Grain Temperature Difference
The maximum allowable difference in temperature between the meter and the sample for which an accurate moisture determination can be made shall be specified. The minimum temperature difference shall be 10 °C. No moisture value may be displayed when the maximum allowable temperature difference is exceeded. An appropriate error message shall be displayed when the difference in temperature between the meter and the sample exceeds the specified difference.
(Added 1993)(Amended 1995)

(e) Test Weight per Bushel Range of the Grain or Seed
The test weight per bushel range for each grain or seed for which the meter is to be used shall be specified. A test weight per bushel value may be displayed when the test weight per bushel range is exceeded if accompanied by a clear indication that the test weight per bushel range has been exceeded.

S.1.4. Value of Smallest Unit. - The display shall permit ~~constituent~~ moisture value determination to both 0.01 percent and 0.1 percent resolution. The 0.1 percent resolution is for commercial transactions; the 0.01 percent resolution is for type evaluation and calibration purposes only, not for commercial purposes. Test weight per bushel values shall be determined to the nearest 0.1 pound per bushel.

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S.2.4. Calibration Integrity

S.2.4.1. Calibration Version. - A meter must be capable of displaying either calibration constants, a unique calibration name, or a unique calibration version number for use in verifying that the latest version of the calibration is being used to make moisture content and test weight per bushel determinations.
(Added 1993)(Amended 1995)

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S.2.6. Determination of Quantity and Temperature. - The moisture meter system shall not require the operator to judge the precise volume or weight and temperature needed to make an accurate moisture determination. External grinding, weighing, and temperature measurement operations are not permitted. In addition, if the meter is capable of measuring test weight per bushel, determination of sample volume and weight for this measurement shall be fully automatic.
(Added 1994)(Amended 1995)

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S.4. Operating Instructions and Use Limitations. - The manufacturer shall furnish operating instructions for the device and accessories that include complete information concerning the accuracy, sensitivity, and use of accessory equipment necessary in obtaining a moisture content. Operating instructions shall include the following information:

(a) name and address or trademark of the manufacturer;
(b) the type or design of the device with which it is intended to be used;
(c) date of issue;
(d) the kind or classes of grain or seed for which the device is designed to measure moisture content and test weight per bushel;

(e) the limitations of use, including but not confined to the moisture measurement range, test weight per bushel range, grain or seed temperature, maximum allowable temperature difference between grain sample and meter, kind or class of grain or seed, moisture meter temperature, voltage and frequency ranges, electromagnetic interferences, and necessary accessory equipment.

(Added 1984)

N. Notes

N.1. Testing Procedures.

N.1.1. Transfer Standards.[1] - Official grain samples shall be used as the official transfer standards with moisture content and test weight per bushel values assigned by the reference methods. The reference methods for moisture shall be the oven drying methods as specified by the USDA GIPSA. The test weight per bushel value assigned to a test weight transfer standard shall be the average of 10 test weight per bushel determinations using the quart kettle test weight per bushel apparatus as specified by the USDA GIPSA. Tolerances shall be applied to the average of at least three measurements on each official grain sample. Official grain samples shall be clean and naturally moist, but not tempered (i.e., water not added).

(Amended 1992)

N.1.2. Minimum Test.[1]- A minimum test of a grain moisture meter shall consist of tests with samples of each grain or seed type (need not exceed three) for which the device is used, and for each grain or seed type shall include the following:

(a) tests of moisture indications, with samples having at least two different moisture content values within the operating range of the device, and if applicable,

(b) tests of test weight indications, with at least the lowest moisture samples used in (a) above.

(Amended 1986 and 1989)

[Editor's note: Paragraph N.1.2. has been completely re-organized. Some of the wording formerly in sub-paragraph (a) has been moved to the main paragraph. The wording formerly in sub-paragraph (b) has been moved to (a), and the wording now in (b) is new. Underlining indicates *only* additions to wording. No indications are given for relocated wording.]

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[1] The U.S. Department of Agriculture, Grain Inspection, Packers and Stockyards Administration (GIPSA) uses a single brand and model of moisture meter for official inspection of moisture content in grains and other commodities. The moisture calibrations for the model are based on the official air-oven method and are developed and monitored on an established schedule using a broad range (with respect to geographical source, kind, class, moisture content, maturity, etc.) of grain samples at its central laboratory. GIPSA uses a hierarchical series of meter-to-meter intercomparisons to determine whether its field meters are operating within acceptable tolerances ($\pm 0.2\%$ with respect to standard meters). It has been shown that field meters checked by GIPSA procedures perform within H-44 maintenance tolerances (T.2.) when tested (N.1.) using official grain samples. Agencies lacking a sample capability representing the entire nation and traceable to the official laboratory reference method shall not use meter-to-meter field testing.

T. Tolerances[2]

T.1. To Underregistration and to Overregistration. - The tolerances hereinafter prescribed shall be applied to errors of underregistration and errors of overregistration.

T.2. Tolerance Values. - Maintenance and acceptance tolerances shall be as shown in Table T.2. Tolerances for moisture measurements are expressed as a fraction of the percent moisture content of the official grain sample, together with a minimum tolerance. Tolerances for test weight per bushel are (+) positive or (−) negative with respect to the value assigned to the official grain sample.

~~**T.3. For Test Weight Per Bushel Indications or Recorded Representations.** - The maintenance and acceptance tolerances on test weight per bushel indications or recorded representations shall be 0.193 kg/hL or 0.15 lb/bu. The test methods used shall be those specified by the USDA GIPSA.~~
~~(Amended 1992)~~

[2] These tolerances do not apply to tests in which grain moisture meters are the transfer standard.

Table T.2. Acceptance and Maintenance Tolerances for Grain Moisture Meters

Moisture		
Type of Grain or Seed	**Acceptance and Maintenance Tolerance**	**Minimum Tolerance**
Corn, oats, rice, sorghum, sunflower	0.05 of the percent moisture content	0.8 percent in moisture content
All other cereal grains and oil seeds	0.04 of the percent moisture content	0.7 percent in moisture content

Test Weight per Bushel	
Type of Grain or Seed	**Acceptance and Maintenance Tolerance**
Corn, oats	0.8 pounds per bushel
All wheat classes	0.5 pounds per bushel
Soybeans, barley, oats, rice, sunflower, sorghum	0.7 pounds per bushel

UR. User Requirements

UR.1. Selection Requirements.

UR.1.1. Value of the Smallest Unit on Primary Indicating and Recording Elements. - The resolution of the moisture meter display shall be 0.1 percent moisture and 0.1 pounds per bushel test weight during commercial use.

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UR.3.4. Printed Tickets.

(a) Printed tickets shall be free from any previous indication of moisture content or type of grain or seed selected.
(b) The customer shall be given a printed ticket showing the date, grain type, grain moisture results, test weight per bushel, and calibration version identification. The ticket shall be generated by the grain moisture meter system. (Amended 1993 and 1995)

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UR.3.10. Posting of Meter Operating Range. - The operating range of the grain moisture meter shall be clearly and conspicuously posted in the place of business such that the information is readily visible from a reasonable customer position. The posted information shall include the following:

(a) The temperature range over which the meter may be used and still comply with the applicable requirements. If the temperature range varies for different grains or seed, the range shall be specified for each.
(b) The moisture range and test weight per bushel range for each grain or seed for which the meter is to be used.
(c) The temperature range for each grain or seed for which the meter is to be used.
(d) The maximum allowable difference in temperature that may exist between the meter and the sample for which an accurate moisture determination can be made. (Added 1988)

3. Proposed Change to Publication 14 - Use of Manufacturer Supplied Data in NTEP Calibration Updates

Background: At its March 1998 meeting, the Sector reviewed the NCWM Publication 14 requirements for evaluating moisture meter performance in the OCP (Phase II). Of particular concern was the restriction that only the latest three years of NTEP data would be used to make decisions regarding the need to make a calibration update. It was pointed out that dropping 1995 data could significantly reduce or eliminate data for samples at hard to obtain moisture levels. When it was suggested that manufacturers could re-submit the 1995 high moisture data as "manufacturer supplied data", manufacturers noted that under existing rules calibration status for any range can be no better than "pending approval" when based solely on manufacturer data. They pointed out that changing a range from "approved" to "pending approval" from one year to the next gives the appearance that the meters aren't as good this year as last.

Several opinions were voiced regarding a proposal to modify Publication 14 to allow the NTEP Laboratory to use more than three years of crop data to evaluate performance. The NTEP lab representative did not want the NTEP lab to have to decide which years to use or not use (unless it could be shown that any year's data were not valid). He also favored using only the three most recent years of data on the grounds that handling anything other than that was excessively cumbersome and would lead to increased possibility of errors in data handling alone. Some felt that using up to five years of data would increase the probability that resultant calibrations would be closer to the mean of year to year variations. Others believed that the recent acceleration in the rate of introduction of new varieties would give excessive weight to four or five year old data.

When finally put to a vote, the Sector decided by 14 to 0 to retain the existing Publication 14, Section IV requirement to use only the latest 3 years of data [where available].

Discussion: Several instances were noted this year (1998 crop year) where dropping the 1995 NTEP data affected the "approved" and/or "pending approval" status for a moisture interval. As expected, the moisture intervals most often affected were at the calibration extremes. In most cases, it was possible for the manufacturer to maintain a "pending approval" moisture range (the moisture range beyond which "out of moisture range" warnings are triggered) by resubmitting some or all of the 1995 crop data as manufacturer data. There was, however, quite a bit of confusion regarding the criteria for submitting and reviewing manufacturer data.

The review of NTEP calibration data was a fairly straight-forward process for the first three years of the program. After data collection was completed for the most recent crop year, a calibration report was developed using all available NTEP calibration data (none older than 3 years). Where applicable, a second report was developed that included all NTEP data plus any data previously submitted by the manufacturer. If there were no changes to a calibration, the initial reports were used to update moisture ranges on the certificate of conformance (CC). Where new calibrations were developed, manufacturers re-predicted moisture values, using both NTEP and manufacturer data, and a second set of calibrations reports was produced for updating CCs.

Consider the situation for the fifth year of the calibration program. It is still necessary to generate a report using the three most recent years of calibration data (1997, 1998, and 1999). A second report could be developed at the same time using, in addition, data previously submitted by the manufacturer (that would include NTEP data from 1995), but the NTEP laboratory would not know whether the manufacturer wants to use some or all of the 1996 data. One solution to this problem would be for manufacturers to submit a file with manufacturer data (including 1995 and 1996 "old" NTEP data) before November 1, 1999.

There is some confusion regarding tolerances to be applied when reviewing calibration reports that include manufacturer data. Calibration review criteria currently state that "Calibration status for any range can be no better than "pending approval" when based solely on manufacturer data." It is not clearly stated whether "approval" status can be assigned to moisture intervals containing both NTEP (most current three years) and manufacturer data. The NTEP laboratory currently does not assign a calibration status better than "pending approval" to any moisture interval where an instrument does not meet approval tolerances using only the most recent three years of NTEP data, and it upgrades calibration status to "pending approval" only if the addition of manufacturer data brings instrument performance within "approval" tolerances. Although the NTEP Lab believes this was the Sector's intention, it is not stated explicitly in Publication 14.

Conclusion: To address these concerns, the Sector unanimously approved the following changes to Part V, "Criteria for NTEP Moisture Calibration Review", Case VII of the Checklist for Grain Moisture Meters in NCWM Publication 14.

Case VII. Manufacturers may submit supplementary data to extend calibration "pending approval" ranges beyond available NTEP moisture ranges.~~; however, beginning with the 1997 calibration review and certificate update, only~~ All or a portion of the NTEP calibration data not included in the last three crop years may be submitted as manufacturer data. Only manufacturer data supplied in the standard data format, as defined in Appendix C, will be considered when determining calibration ranges and pending approval status.

a. ~~Calibration status for any range can be no better than "pending approval" when based solely on manufacturer data~~. An initial calibration report is prepared using the most recent three years of NTEP calibration data. "Approval" and "pending approval" moisture ranges are determined using the criteria in Section IV ("Tolerances for Calibration Performance") and Section V ("Special Cases Dealing with Inadequately Represented Moisture Intervals"). "Approval" ranges are determined solely on the basis of the most recent three years of NTEP calibration data and cannot be extended by including manufacturer data. "Pending approval" ranges can be extended through the use of manufacturer data.

b. ~~Manufacturer data supplied earlier in graphical or non-standard format must be re-submitted in standard data format. Failure to supply data in standard format may result in withdrawal of "pending" status if data collected by the NTEP lab is not sufficient to support use of the calibration for the range claimed.~~ The process described in (a) is repeated using a second calibration report prepared using the most recent three years of NTEP calibration data plus manufacturer submitted data. Moisture intervals listed as "not approved" on the initial calibration report can be upgraded to "pending approval" if the bias to air oven is within the **approval tolerance** for that moisture interval. Confidence intervals are not applied to approval tolerances for use in determining pending approval ranges when manufacturer data is used.

4. Review of Evaluation Procedure Outlines (EPOs) and Test Procedures for the field evaluation of GMM devices

Background: At the March 1998 GMM/NIR Sector meetings a working group was established to develop EPOs and Field Evaluation Test Procedures for GMM and NIR devices to provide guidance to States on implementing NIST HB 44 as it applied to these devices. Templates were developed to assist the working group with their assignments in documenting the EPOs and field evaluation test procedures. The working group was divided into the 3 teams:

Team 1 - EPO XXX for Grain Moisture Meters and NIST HB 44 Recommended Field Evaluation Test Procedures for Grain Moisture Meters, Whole Grain Sample Method.

Team 2 - EPO XXX for Near Infrared Grain Analyzers and Appendix A of EPO XXX, "NIST HB 44 Recommended Field Evaluation Test Procedures for Near Infrared Analyzers.

Team 3 - Appendix B, Alternative Field Evaluation Test Procedures for Grain Moisture Meters, Meter to Meter Method.

Discussion: Diane Lee, NIST-OWM, explained that EPOs are intended to be check lists which follow NIST HB 44. Test Procedures, on the other hand, should include specific procedures which must be followed to perform field evaluations (procedures for preparing samples may be included, as appropriate). Initial drafts of the EPOs and Test Procedures were reviewed by the Sector.

EPO Review and Comments

1. Several of the items in the check list are specifications which can be verified only during NTEP conformance testing.
2. The organization of items is confusing. It was suggested that items common to both Sec. 5.56.(a) and Sec.5.56.(b) of the code be placed in a section listing requirements applicable to all GMMs regardless of date of manufacture. Also, some of the items listed from the General Code are covered in detail in the GMM Code. In these cases, the GMM Code takes precedence, and the General Code need not be repeated.
3. Reference is made to NTEP and non-NTEP meters, but the requirement states that the "NTEP requirements are applicable to any GMM manufactured or in service after January 1, 1998.
4. The Scope section should be expanded to include what is being evaluated when using the Test Procedures of Appendix A vs. Appendix B (e.g., Appendix B, Meter to Like Meter - hardware check).

Test Procedures Review and Comments

1. Editing is needed to achieve consistency between the procedures.
2. If alternative procedures are available, the Scope section of each procedure should describe the situation that would lead to the choice of that particular procedure.
3. Equipment lists should contain only those items necessary to perform the field test described by the procedure.
4. The sub-title of Appendix A, "Whole Grain Sample Method" is not sufficiently descriptive (Appendix B also uses "whole grain samples"). Alternate suggestions: "Oven Reference Method Using Grain Samples as Transfer Standards" or, simply, "Oven Reference Method".

Don Onwiler, Nebraska Department of Agriculture, Weights and Measures Division, suggested that the sentence, "This procedure is not the recommended test procedure of NIST HB 44" be removed from the draft Test Procedure for the Meter to Meter Method. He pointed out that a properly administered meter to like meter testing program is a valid method of determining if devices are functioning properly. He reminded the Sector that an "adjusted" oven moisture method, also not the recommended NIST HB 44 procedure, was being used in other jurisdictions. [Definition of "Adjusted" oven moisture method: At the time the inspector obtains "fresh" oven moisture samples from the lab, a comparison is made between the oven moisture value of each sample and the moisture determined on a GMM which the inspector carries on inspections. Subsequently, before each field inspection, samples are again measured on the inspector's GMM. If this measurement (compared to the initial measurement made on the inspector's meter) reveals a moisture loss on any sample, the oven moisture of that sample is adjusted to reflect this loss. When the moisture loss exceeds a specified amount, samples are discarded.]

Don's comments sparked a discussion on the pros and cons of meter to meter testing, raising questions on the validity of meter to un-like meter tests. One Sector member pointed out that although it was possible to locate samples which responded similarly on different models of dielectric based GMMs, it would be much more difficult to find samples which responded similarly on both dielectric and NIR devices. Sidney Colbrook, Illinois Department of Agriculture, recalled that prior to 1987, Illinois had used the meter to like meter method, but more than once found it difficult to explain to a grain elevator operator how 2 meters of different make could both pass their test but be different from each other by 1.5 % in moisture content. The Sector acknowledged that the situation today is different. There is now a national program to standardize moisture calibrations. The NTEP Phase II Ongoing Calibration Program uses a National Sample Set traceable to the official laboratory reference method. Meters of different make in the NTEP Phase II OCP are now closely aligned to this National Sample Set.

A meter to like meter program includes: 1) verifying that the correct calibration is installed, and 2) that a meter is functioning properly (a hardware test) on each grain type. With meter to like meter testing it may be possible to reduce the maintenance tolerance to be more discriminating, because the tolerance will not have to include the added variance required to account for the inability to get exactly the same results on different meter types (even with carefully selected samples). Also, with meter to like meter testing, oven moisture determinations do not have to be performed on field test samples. The inspector's meter becomes the transfer standard. The grain is a medium used to obtain a relevant comparison.

Considering Don Onwiler's request, the Sector suggested that the sentence, "This procedure is not the recommended test procedure of NIST HB 44" be replaced by wording to the effect: "This procedure is an alternative procedure applicable to meters of the same types as those in the NTEP Phase II Ongoing Calibration Maintenance Program where the accuracy of moisture calibrations have been verified with a National Sample Set traceable to the official air oven reference method."

Conclusion: Because of time limitations, and recognizing that major editing might be involved in a line-by-line review of each EPO and Test Procedure, the NIST representative was asked to edit the EPOs and Test Procedures to incorporate the Sector's suggestions. Electronic copies of the edited documents will be sent to Sector members for review and comment by November 15, 1999.

5. Update on the Status of the Interagency Agreement for Funding the OCP

Background: At the Sector's March 1998 meeting, Diane Lee, representing NIST, and Rich Pierce, representing GIPSA, announced that NIST and GIPSA had agreed on a proposal for funding the On-going Calibration Program (OCP) beyond 1999 on a more permanent basis. As proposed at that time, the initial agreement would cover a five year period. After that, it would be renewed automatically, subject to an annual review to determine if changes should be made. Under the proposed agreement, NIST and GIPSA would each contribute one-third the cost of the program subject to an annual maximum of $18,000 each. The balance of costs would be borne by manufacturers and would depend on the number of meter models in the NTEP "pool". Program costs would exclude the official meter (GIPSA would cover the costs associated with the official meter), but DICKEY-john would participate in the program contributing on the same basis as other participating manufacturers. Manufacturers were polled to determine if the proposed sharing of costs was acceptable. They were in general agreement that the one-third, one-third, one-third sharing of costs (even with an $18,000 cap each for GIPSA and NIST) was reasonable, noting that the proposed fees for participating in the OCP were small in comparison to the costs they had incurred in obtaining NTEP approval and keeping up with changes in NTEP requirements.

Discussion: Diane Lee reported that the Interagency Agreement had been signed by all parties. The new OCP Fee Schedule will become effective at the beginning of the Federal Government's Fiscal Year 2000 (October 1, 1999) and will run through FY2004. The cost to manufacturers depends on the number of meter types in the NTEP Pool (see following table).

NTEP Ongoing Calibration Program
Participation Fee Schedule for FY2000 - FY2004

Number of meters in NTEP pool (excluding GIPSA's Official Meter)	Cost to Manufacturers per Meter Type
1	$2,250
2	$3,000
3	$3,375
4	$3,600
5	$5,250
6 (number currently in pool)	$6,429
7	$7,313
8	$8,000
9	$8,550

6. Update on Type Evaluation and Phase II Testing

Rich Pierce of the Grain Inspection, Processors and Stockyards Administration (GIPSA, formerly FGIS), the NTEP Participating Laboratory for Grain Moisture Meters, reported that the NTEP Lab had 3 active applications: 1) Testing has been completed and a report is being prepared on an application to add a like model to an existing certificate; 2) Testing has also been completed to extend the temperature ranges on an existing certificate; and 3) An application was received in June 1999 for new meter model, but because of Phase II OCP priorities, no testing has been performed yet on the new model. He also presented summary data for the crop years 1996 - 1998 showing how well meters in the NTEP Phase II Ongoing

Calibration Program have performed as a group. Meters are well aligned with each other and also well aligned with the official air oven. An abbreviated summary for 5 of the fifteen NTEP grains is shown in the following table.

Moisture Interval % moisture	Average Difference between All Meters and Air Oven All Samples from National Calibration Set for 1996, 1997, and 1998 Crop Years (% moisture content)				
	CORN	SOYBEAN	SOFT RED WINTER WHEAT	SORGHUM	SIX-ROWED BARLEY
4 - 6	-------	-------	-------	-------	-------
6 - 8	-0.14	0.23	-------	-------	0.15
8 - 10	0.00	0.10	0.00	-0.27	0.16
10 - 12	0.03	0.01	0.06	0.16	0.09
12 - 14	-0.04	0.00	0.04	0.09	0.03
14 - 16	0.04	0.00	0.01	-0.04	-0.05
16 - 18	0.10	-0.11	-0.10	-0.11	-0.48
18 - 20	0.15	-0.05	0.09	-0.12	-0.19
20 - 22	-0.03	-0.24	-0.12	-0.26	-0.61
22 - 24	0.08	-1.29	-------	-0.14	-------
24 - 26	0.02	-------	-------	0.00	-------
26 - 28	0.13	-------	-------	-0.09	-------
over all moistures	0.04	0.00	0.02	0.01	0.03

7. Status of NTEP Meters in the Field - Review of Data from State Inspections

Background: At previous Sector meetings, the issues of: 1) the States becoming more involved with NTEP, and 2) obtaining objective evidence that NTEP and the OCP are working, have been discussed. To address these issues, several States provided NIST with data obtained in the process of performing field inspections on NTEP Grain Moisture Meters (both dielectric and near infrared types). Diane Lee reported on results received from Arkansas, Maryland, Illinois, and North Carolina. The Sector was encouraged by the results which show significant improvement compared to baseline data collected several years ago.

Moisture Interval % moisture	Average Difference between NTEP Meters and Air Oven All Data from Field Inspections in AR, MD, IL, & NC (% moisture content / SDD)									
	n	CORN	n	SOYBEAN	n	SOFT RED WINTER WHEAT	n	SORGHUM	n	BARLEY
10 - 12	0	no data	8	-0.20 / 0.22	0	no data	0	no data	0	no data
12 - 14	2	0.59 / 0.01	40	-0.03 / 0.19	36	-0.31 / 0.33	0	no data	0	no data
14 - 16	50	0.07 / 0.34	49	-0.02 / 0.21	31	-0.21 / 0.24	4	-0.26 / 0.09	12	0.20 / 0.15
16 - 18	52	-0.09 / 0.27	12	-0.35 / 0.29	40	0.05 / 0.27	0	no data	0	no data
18 - 20	51	-0.16 / 0.33	0	no data	0	no data	0	no data	0	no data

n = number of meters

8. Process for Making Midyear Changes to NTEP GMM/NIR Certificates of Conformance (CCs)

Background: In February of 1999, the USDA Grain Inspection, Packers and Stockyards Administration (GIPSA) released revised moisture calibrations for corn, high moisture corn, and soybeans for the official grain moisture meter, stipulating that the new calibrations were to be used for all official moisture determinations on and after February 22, 1999. The changes were meant to correct moisture measurement differences that were observed in the field under certain testing conditions and to improve moisture measurement accuracy for corn and soybeans at extreme temperatures. GIPSA's action necessitated a mid-year change to the NTEP CC for DICKEY-john's GAC 2100, the official grain moisture meter. NIST, in conjunction with the NTEP Laboratory, developed a process for handling midyear CC changes. Diane Lee and Rich Pierce explained the process emphasizing that regardless of when a CC is re-issued for a mid-year change, all CCs expire on June 30. Because of the costs assessable to manufacturers for re-issuing CC, it may be advisable to plan to make some types of changes (such as adding a new model of like type or changing a description or feature) to coincide with the normal annual re-issue date. A copy of the revised flowchart of the process is attached.

9. Fees for NTEP Applications and Evaluation of Grain Moisture Meters

Background: For the benefit of present and potential applicants for NTEP evaluation of Grain Moisture Meters, Diane Lee, representing NIST, and Rich Pierce, representing the NTEP participating laboratory, reviewed the process for submitting an application for device type evaluation and enumerated the fees relating to various steps in Phase I (initial device evaluation) and Phase II (ongoing calibration program). The fee structure is summarized in the following tables.

In a related matter, Dr. Pierce, representing the NTEP laboratory, reported that several manufacturers were not observing the deadlines for submission of re-predicted data and calibration changes. This is causing a delay in updating CCs. It was suggested that sending reminders to manufacturers and publishing a table of due dates on the web site might alleviate the problem . The possibility of assessing "late fees" was also mentioned, but no action was taken.

Fees Associated with the National Type Evaluation Program (NTEP) for Grain Moisture Meters				
Type of Fee	Amount	Fee Is Applied	Condition	Billed by
Application	$690	per application	Initial evaluation (Phase I) Phase II (OCP) **only** if changes have been made to the device. *If no changes have been made, there is no fee for phase II applications.*	NIST-OWM
CC drafting & processing by NIST	$500	per CC	When CC is drafted by NIST	NIST-OWM
CC processing only by NIST	$150	per CC	When CC is drafted by the NTEP laboratory or manufacturer	NIST-OWM
CC Drafting by NTEP Lab	see note 1	per hour	When CC is drafted by the NTEP laboratory or manufacturer	NTEP lab see note 2
Phase I Testing	see note 1	per hour	Testing performed by NTEP lab	NTEP lab see note 2
Phase II Testing	see note 1	per hour	Testing performed by NTEP la	NTEP lab see note 2
Phase II Participation Fee (Starting FY 2000)	see GMM agenda item 5	annually	When participating in the Phase II OCP (participation is required to maintain an Active CC)	NTEP lab see note 2
CC Maintenance Fee	$100	annually (December)	Cost of maintaining CCs	NCWM, Inc.
Note 1: See grain moisture meter NTEP Laboratory fees. Note 2: For grain moisture meters, NTEP Laboratory fees are billed though the National Finance Center. Note 3: All fees are subject to change.				

National Type Evaluation Program - Grain Moisture Meters Typical NTEP Laboratory Fees for Phase I, Initial Type Evaluation			
Activity/Test	Estimated Labor (hours) see notes 1 & 2	Air Oven Tests see note 3	Fees see note 1
Publication 14 Checklist	8	0	$384.00
Prepare Test Sample Sets	6	0	$288.00
Power Supply	1.75	7	$126.00
Storage Temperature	1.75	5	$114.00
Leveling	1.75	0	$84.00
Warm-up Time	1.25	3	$78.00
Humidity	1.75	3	$102.00
Instrument Stability	2	12	$168.00
Instrument Temperature Sensitivity	2.25	18	$216.00
Sample Temperature Sensitivity	25.5	0	$1,224.00
Accuracy, Precision, and Reproducibility	20.25	180	$2,052.00
Bias Check for 12 NTEP Grains	27	288	$3,024.00
Prepare NTEP Test Report	8	0	$384.00
Draft Certificate of Conformance	6	0	$288.00
		Total Estimated Cost	$8,532.00

Note 1: If device fails any test and requires re-testing, there will be additional costs to the manufacturer.
Note 2: Current labor rate is $48.00/hour.
Note 3: Current fee for air oven tests: $6.00/test
Note 4: All Rates and Fees are subject to change.

10. Update on the Structure of NCWM and the Organization of NTEP

Background: A decision was made by NIST management that the Office of Weights and Measures would not hire an employee to continue meeting planning activities for the Conference after its meeting planner retired. NIST contracted with the meeting planner to continue providing these services for two years to give the NCWM time to make other arrangements. The NCWM contracted with a management company to perform these administrative functions of the Conference.

The NCWM was incorporated in August 1997 to protect them from liability in various NCWM activities. NCWM, Inc. is now assuming many of the NCWM business and administrative functions previously performed by NIST. For the most part, the impact of these changes will be transparent with respect to the operation of the technical sessions of the Conference. The NCWM's current Constitution and Bylaws are combined into one publication called the "Bylaws of the National Conference on Weights and Measures, Inc." Under the Bylaws, the Executive Committee has become the "Board of Directors" (BOD) of the corporation and the NTEP Board of Governors has become the "NTEP Committee".

Diane Lee reported that the NCWM, Inc. BOD recently decided to assume responsibility for management and administration of NTEP. Some of the transition activities and recent meetings were reviewed with the Sector. Several Sector members whose companies were recognized under ISO 9001 expressed concern about what effect the move of their CCs from NIST to NCWM, Inc. might have upon their ISO 9001 status.

(Editorial Note: In a meeting on October 28, 1999, at NCWM Headquarter's, NIST and the NCWM BOD tentatively agreed on a plan of actions and strategies that will clarify and redefine respective roles in support of uniformity of the U.S. weights and measures system. The redefined roles of NIST will foster stronger technical support and assistance to NCWM activities and provide a smooth transition of the management of NTEP to NCWM, Inc.)

Current information on the NTEP Transition is located on the NIST-OWM web site at http//www.nist.gov/nteptransition. As the transition progresses, updates will be provided.

11. Report on the 1998 NCWM Annual Meeting and the 1999 NCWM Interim and Annual Meetings

Background: Diane Lee, NIST/OWM, reported on items of interest to the Sector that were acted on at NCWM Annual and Interim Meetings which have taken place since the Sector last met in March of 1998.

The 1998 National Conference on Weights and Measures (NCWM) Annual Meeting was held July 12-16, in Portland, Oregon. The Specifications and Tolerances (S&T) Committee GMM items listed below were adopted by the Conference as proposed in the *Program and Committee Reports for the 83rd Annual Meeting*, NCWM Publication 16, dated April 1998. Additional discussion of these issues can be found in that publication. The changes have been incorporated in the 1999 edition of Handbook 44, issued November 1998.

- **S&T Item 356-1: Table S.2.5 Categories of Device and Methods of Sealing; Category 3**
  Background: During its 1997 review of proposed Sealing Requirement changes to Publication 14, the Sector noted that there was no requirement for a Category 3 device to indicate that it is in the configuration mode during remote access to sealable parameters. The Sector agreed that the requirements for a Category 3 device should be no less stringent than for Category 2 devices. When in the remote configuration mode, Category 2 devices must clearly indicate that they are in the remote mode and shall not be capable of providing measurement operations. The Sector recommended similar requirements be added to Table S.2.5. of Grain Moisture Meter Code 5.56(a) for Category 3 devices.

- **S&T Item 356-2 Grain Types Considered for Type Evaluation and Calibration and Minimum Acceptable Abbreviations**
  Background: GIPSA has combined the wheat classes "Eastern White Wheat" and "Western White Wheat" into a single new class designated "Soft White Wheat." At its September 1997 meeting the Sector unanimously recommended changes to Table S.1.2. of Grain Moisture Meter Code 5.56(a) to reflect this change in wheat classes.

- **S&T Item 356-3 Amend S.2.4.3 Calibration Transfer**
  Background: At its March 1997 meeting, the Sector proposed revisions to paragraph S.2.4.3 of Grain Moisture Meter Code 5.56(a) to make it clear that calibrations must be transferable between instruments of like type **without** requiring user slope or bias adjustments. The proposed revisions were also intended to clarify the difference between standardization adjustments (or parameters) and grain calibration coefficients. The Sector recommended that the changes be nonretroactive and effective as of of January 1, 1999.

  The Executive Committee GMM agenda item listed below was changed from voting to informational because of the extent of changes from the March 1998 Sector meeting and because of due process concerns. [Note: This item was carried over to the Agenda for the 1999 Interim Meeting as Board of Directors (BOD) Item 102-9. Because of the incorporation of the NCWM and changes in the organization of NTEP, this item became **NTEP Committee Item 501-9** at the 1999 Annual Meeting.]

- **Executive Committee Item 102 –10 Additions and Revisions to the Definitions for Grain Moisture Meters in NCWM Publication 14**

Background: This item addressed the unique treatment of Certificates of Conformance (CCs) for grain moisture meters (GMMs). Modifications to the Administrative Procedures of Publication 14 were proposed to specify the requirements for maintaining an active CC for a GMM and to define what happens when a CC is allowed to expire.

The 1999 NCWM Interim Meeting was held January 31 - February 4, 1999 in Albuquerque, New Mexico. The NTEP Committee, accepted Item 102-9 (renamed NTEP Committee Item 501-9) as a voting item for the 1999 Annual Meeting as proposed in the *Interim Meeting Agenda*, NCWM Publication 15. Item 102-9 was a carry over from Item 102-10 from the 1998 Conference.

The NCWM Annual Meeting was held July 25-29, 1999 in Burlington, Vermont. The following item was approved by the Conference. [Note: The item number shown below corresponds to the item number in *Committee Reports for the 84th Annual Meeting*, NCWM Publication 16. It was Item 102-9 at the 1999 Interim Meeting.]

- **NTEP Committee Item 501-9 Additions and Revisions to the Definitions for Grain moisture Meters in NCWM Publication 14.**
  Background: This is a carry over of Item 102-10 from the 1998 Annual Meeting (see above.) The final recommendation approved by the Conference is shown below (additions are underlined.)

N. Status of Certificate of Conformance; Maintenance Fee
Except for Grain Moisture Meters, a Certificate of Conformance does not have an expiration date; however, the device manufacturer must update the design of a device to meet new or modified requirements adopted by the NCWM. The NCWM charges a maintenance fee for Active Certificates to support the technical and administrative activities of the NCWM for NTEP.

1. Declaration of Status by Certificate Holder
The Certificate holder, usually the manufacturer or remanufacturer, declares intent to continue to manufacture or remanufacture the device by paying to the NCWM, an annual maintenance fee for the Certificate. If the maintenance fee is not paid (or if other outstanding bills have not been paid or arranged to be paid for the issuance of a Certificate), the Certificate is "inactive."

In addition to the above, Grain Moisture Meter manufacturers must pay an annual participation fee for the NTEP laboratory On-going Calibration Program, OCP (Phase II) in order to maintain their certificate in an Active status.

2. Active Status
Devices are being manufactured or remanufactured for commercial applications under an NTEP Certificate of Conformance. This means that the Certificate is in force with a hard copy of the Certificate issued and distributed.

In addition to the above, a Grain Moisture Meter must remain in the OCP (Phase II), and the manufacturer must continue to pay the required maintenance fee. Grain Moisture Meter Certificates may also be assigned an Active status if: (1) the original manufacturer no longer manufacturers or remanufactures the device but continues to participate in the OCP (phase II); or (2) a third party elects to maintain the calibrations after a Certificate expires for a device in which the original manufacturer has stopped manufacturing or re-manufacturing the device. (See Note.)

3. Effective Status
Equivalent to ACTIVE status, but a hard copy of the Certificate of Conformance has not yet been issued and distributed. Therefore, a hard copy of the Certificate is not yet included in Publication 5.

4. Inactive Status
An Inactive Certificate of Conformance is a Certificate which was previously Active, but the devices are no longer being manufactured or remanufactured for commercial applications. However, devices already manufactured, installed, or in inventory, but not yet sold, may be used, sold, repaired, and resold, under an Inactive Certificate of Conformance.

5. Withdrawn Status
The Certificate of Conformance remains valid unless withdrawn as the result of a specific determination by NTEP.

A Certificate of Conformance may be withdrawn

a. for deficiencies in the type, or
b. when production devices do not meet type.

Additionally, a Grain Moisture Meter Certificate may be withdrawn when for two consecutive years problems or deficiencies occurring in the OCP (Phase II) have prevented the issuance of valid calibration constants for all calibrations previously classified as "Approved" or "Pending". After a Certificate is withdrawn, the manufacturer must submit a new application and application fee per device model and the device must be reevaluated in Phase I before it is entered in the OCP (Phase II). Any meters manufactured after a Certificate is withdrawn, cannot be sold or placed into service for commercial use. Meters in service will be subject to individual State enforcement activities.

6. Expired Status

An Expired status is assigned to a Grain Moisture Meter Certificate of Conformance when a manufacturer elects to discontinue participation in the On-Going Calibration Program and the calibrations listed on the CC were performing acceptably at the time the manufacturer stopped participating in the OCP (Phase II).

Any meters manufactured after a Certificate has expired cannot be sold or placed into service for commercial use. Meters in service may be used, but actions taken would depend on individual State enforcement activities. (See Note.)

Note: A third party would be allowed to assume the responsibility for maintaining calibrations for a device which has expired without re-entering Phase I if the party participates in the OCP (Phase II) testing the year the original certificate expires, and providing the original manufacturer certifies that the device will no longer be manufactured or remanufactured. In this case, the third party must: (1) submit evidence of authorization from the original manufacturer for use of previous test results and also certification from the original manufacturer that the device will no longer be manufactured or remanufactured; (2) submit a new application; (3) pay the participation fee for the device; (4) demonstrate the ability to re-predict moisture data and modify calibrations as required; (5) pay the maintenance fee for the new certificate; and (6) permanently mark the device with the company name. After successful completion in the OCP an Active Certificate with a new number would be issued for the device submitted by the third party.

12. Time and Place for Next Meeting

The next meeting is tentatively planned for the week of August 21, 2000 in the Kansas City, MO area. Meetings will be held in the conference facility at the GIPSA Tech Center. An optional NIR training session for W&M Field Inspectors and other interested parties is being planned to precede the Sector meetings. A tentative schedule is shown below.

Tuesday, August 22	1:00 pm - 5:00 pm	Optional NIR training session
Wednesday, August 23	8:00 am - 12:00 noon	Optional NIR training session
Wednesday, August 23	1:00 pm - 5:00 pm	NIR Grain Analyzer Sector Meeting
Thursday, August24	8:00 am - 5:00 pm	GMM Sector Meeting
Friday, August 25	8:00 am - 12:00 noon	GMM Sector Meeting

The above schedule is subject to change pending confirmation of funding availability and determination of final agenda issues. Please try to keep that week open until firm dates have been set.

National Type Evaluation Technical Committee
Near Infrared (NIR) Grain Analyzer Sector
September 10, 1999 St. Louis, MO
Meeting Summary

Agenda Items

*1. Election of Sector Chairperson
*2. Update on the Structure of NCWM and the Organization of NTEP
3. Report on the 1999 NCWM Interim and Annual Meetings
*4. Time and Place for Next Meeting
5. NIR Tentative Code Study and NCWM Specifications and Tolerance Committee Item 357-2, Indication of Additional Constituent Values
6. Review of Evaluation Procedure Outlines (EPOs) and Test Procedures for the Field Evaluation of Near Infrared Grain Analyzers

Note: Because of common interest, items marked with an asterisk (*) will be considered in joint session of the NIR Grain Analyzer and the Grain Moisture Meter Sectors.

1. Election of Sector Chairperson

Richard (Will) Wotthlie, Maryland Weights and Measures, was re-elected to the post of Chairperson for both the Grain Moisture Meter Sector and the Near Infrared Grain Analyzer Sector by unanimous vote of those present. Under the rules adopted by the Sector in March of 1996, he will serve for a 3-year term or until a successor is elected.

2. Update on the Structure of NCWM and the Organization of NTEP

Background: A decision was made by NIST management that the Office of Weights and Measures would not hire an employee to continue meeting planning activities for the Conference after its meeting planner retired. NIST contracted with the meeting planner to continue providing these services for two years to give the NCWM time to make other arrangements. The NCWM contracted with a management company to perform these administrative functions of the Conference.

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Diane Lee reported that the NCWM, Inc. BOD recently decided to assume responsibility for management and administration of NTEP. Some of the transition activities and recent meetings were reviewed with the Sector. Several Sector members whose companies were recognized under ISO 9001 expressed concern about what effect the move of their CCs from NIST to NCWM, Inc. might have upon their ISO 9001 status.

(Editorial Note: In a meeting on October 28, 1999, at NCWM Headquarter's, NIST and the NCWM BOD tentatively agreed on a plan of actions and strategies that will clarify and redefine respective roles in support of uniformity of the U.S. weights and measures system. The redefined roles of NIST will foster stronger technical support and assistance to NCWM activities and provide a smooth transition of the management of NTEP to NCWM, Inc.)

Current information on the NTEP Transition is located on the NIST-OWM website at www.nist.gov/ntep. As the transition progresses, updates will be provided.

Discussion: In connection with a discussion relating to what effect the NTEP transition might have on NTEP participating laboratories, David Funk, GIPSA, announced that GIPSA was now ready to move forward to obtain recognition as the NTEP

laboratory for NIR Grain Analyzers. (The approval of an NTEP laboratory for NIR Grain Analyzers has been on hold for several years.) He was urged to submit the required information as soon as possible (preferably by the end of 1999).

3. Report on the 1999 NCWM Interim and Annual Meetings

The 1999 NCWM Interim Meeting was held January 31 - February 4, 1999 in Albuquerque, New Mexico, and the 1999 NCWM Annual Meeting was held July 25-29 in Burlington, Vermont. Diane Lee, NIST/OWM, reported on items of interest to the Sector.

- **S&T Item 357-1 Near-Infrared Grain Analyzers - Tentative Code; Removal of Retroactive Dates.**
  This item was accepted by the conference. In the next issue of NIST Handbook 44, retroactive dates will be removed and the non-retroactive date of January 1, 2000 will be changed to January 1, 2002.

- **S&T Item 357-2 Near-Infrared Grain Analyzers - Tentative Code; Indication of Additional Constituent Values.**
  Based on industry comments that the requirements may be premature, the Specifications and Tolerances Committee assigned this issue informational status. See Agenda Item 5, this Summary, for additional discussion of this issue.

4. Time and Place for Next Meeting

The next meeting is tentatively planned for the week of August 21, 2000 in the Kansas City, MO area. Meetings will be held in the conference facility at the GIPSA Technical Center . An optional NIR training session for W&M Field Inspectors and other interested parties is being planned to precede the Sector meetings. A tentative schedule is shown below.

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The above schedule is subject to change pending confirmation of funding availability and determination of final agenda. issues. Please try to keep that week open until firm dates have been set.

5. NIR Tentative Code Study and NCWM Specifications and Tolerance Committee Item 357-2, Indication of Additional Constituent Values

Background: At the Sector's March 1998 meeting, Weights and Measurers representatives reported that they were seeing an increasing number of NIR Analyzers in their jurisdictions. It was also reported that much of the commercial usage for the NIR devices was for corn and soybeans. In recognition of this fact, the Sector proposed modifications to the NIR Grain Analyzer Tentative Code (See Item 357-2, Committee Reports for the 84th Annual Meeting, NCWM Publication 16 for details of the modifications) to include tests for corn (protein, oil, and starch), barley (protein), and soybeans (protein, oil). The Sector also determined that with an increasing number of instruments in the field and an increasing need for requirements to regulate NIR Analyzers, additional information from a study of these devices in accordance with the NIST Handbook 44 NIR Tentative Code would provide useful information needed to make recommendations to upgrade the tentative code to a permanent code.

Discussion: Several states participated in a study of the Tentative Code and the proposed modifications. Maryland and Georgia collected samples. Arkansas, Iowa, Illinois, Missouri, Nebraska and North Carolina collected samples and tested NIR devices. At the time of the Sector's September 1999 meeting, results were received from five states: Arkansas, Iowa, Illinois, Nebraska and North Carolina. Diane Lee, NIST Office of Weights and Measures, presented the results of the study. In the study, NIR instruments were tested using soft red winter wheat (protein), soybeans (protein and oil) and corn (oil). Soybean samples used in the study were from Georgia, Missouri and Maryland, the soft red winter wheat samples were from North Carolina, and the corn samples were from Illinois. Reference constituent values were determined by USDA/GIPSA. The samples used in the study met the requirements of the Tentative Code. Tests for protein and starch in corn were to be included in the study, but the samples tested did not meet the requirements of the Tentative Code and, therefore, were not included in the study. The results of Nebraska's July 1996 survey of 29 devices using 3 samples of hard red winter wheat

(as opposed to 5 samples specified in the Tentative Code) were also included in the report. The overall results are summarized in the following table.

Preliminary Results of the NIST Handbook 44
Near Infrared Grain Analyzer Tentative Code Study (including study of proposed modifications)
as of September 1999

	Corn	Soybeans		Wheat
	oil @ 0% m	**oil @ 13% m**	**protein @ 13% m**	**protein @ 12% m**
Number of devices tested	57	31	32	48
Number of devices failing one or more tests	27	3	6	21
device rejection rate	47.4%	9.7%	18.8%	43.8%
% failing test criteria 1	21.1%	9.7%	18.8%	18.8%
% failing test criteria 2	8.8%	0.0%	12.5%	35.4%
% failing test criteria 3	19.3%	0.0%	6.3%	22.9%

criteria 1: individual sample test; criteria 2: average of 5 samples; and criteria 3: range for 5 retests.
m = moisture (wet basis)

The final NIR study report will be completed and distributed after additional information which was requested from the participants is included in the report.

In comments submitted by Grain Industry representatives on the Sector's proposed addition of corn, soybeans, and barley to the Tentative Code, the industry expressed the belief that it was premature to establish a specific moisture basis in the NIR code for products other than the 12 % basis for wheat, because the marketplace is currently unsettled on an appropriate moisture basis for many of the commodities, such as high oil corn. It was their belief that establishing specific moisture bases for these products could create confusion and potential market disruption if W&M officials enforce the proposed moisture bases for corn and soybeans when commercial contracts call for different bases. The Grain Industry prefers flexibility in setting a moisture basis for a specific product because of the wide differences in moisture bases used when buying or selling grains with unique characteristics.

Reviewing the field survey data, the Sector noted that a significant number of rejects may have been due to a misunderstanding on the part of some device operators as to what moisture basis the device had been calibrated for, or confusion about how to handle the conversion between the device's reading and a different moisture basis.

When one Sector member questioned the tolerance applied to the range of 5 retests for oil in corn, believing it might be too tight, another member suggested that the instruments exhibiting excessive range may, in fact, have sample feeding problems.

In the ensuing discussion, it became apparent that the practical problems associated with maintaining uniformity between devices in the field seemed to mandate that inspections, tolerances, and regulatory samples used in inspection be based on specified fixed moisture bases. On the other hand, the Sector recognized that the Grain Industry requires the flexibility to use different moisture bases. The Federal System addresses this problem by reporting constituent concentrations at both a "standard" moisture and at the moisture basis requested by the customer (if other than "standard"). For example, if a dry basis protein is requested for wheat which has a "standard" moisture basis of 12%, the report contains a statement to the effect: 14% protein at 12% moisture, at 0% moisture the protein is 15.9%.

Present day commercial devices handle the conversion to different moisture bases in a variety of ways. Some of the devices encountered on the survey had been calibrated to read direct at dry basis. Conversion to other moisture bases was accomplished by manually multiplying the device's dry basis reading by 100 minus the new basis divided by 100 (e.g., multiply device reading by 0.85 to find constituent value at 15% moisture basis). Some measured on an "as is" moisture basis

and could convert to any moisture basis keyed in by the operator, but required that the device also be calibrated to measure moisture of the sample. Others were calibrated to read direct at a fixed non-zero moisture basis. Assessing the suitability of many NIR instruments for operating in a regulatory environment, the Sector recognized the following problems:

- constituent results were frequently displayed/recorded with no clear indication of moisture basis
- there was no way for field inspectors to determine the moisture basis on which calibration was derived

The issue of special calibrations for genetically modified organisms (GMOs) such as herbicide resistant soybeans and high oil corn was raised. A case was cited in which a calibration was tailor-made to fit a company's product. Contracts stipulated the use of the tailor-made calibration in determining product acceptability. A measurement system closely tied to one product provides a barrier to entry for other products. Competitive products of equal inherent value were less likely to pass because they didn't "fit" the special calibration. It was suggested that it might be appropriate for NIST/OWM to hold an informational meeting at which representatives of the special genetics industry, the grain processing industry, the grain trade, and producer organizations could be made aware of what is meant by national uniformity and how the desire to provide equity in the marketplace will affect the use of NIR devices in a regulated environment. Noting that although GIPSA is not required to provide inspection for non-grade determining factors, David Funk reported that GIPSA did have an interest in providing measurements on value added commodities, especially those which might lead to expanded markets for U.S. grain. In this regard, he said that GIPSA would be meeting individually with some of the bio-technology companies that have developed GMOs to discuss how GIPSA and these companies might work together.

Several Sector members expressed the belief that establishment of a Nationally recognized reference laboratory was a key requirement for a workable enforcement program. Even if multiple laboratories were recognized, it would be important to establish a single referee lab with the authority to settle disputes.

Conclusion: Until issues discovered during the NIR Tentative Code study can be resolved, the Sector agreed that the existing Code should remain tentative as modified by the conference at the 1999 Annual Meeting (See Summary Item 3, Conference **Item 357-1, Removal of Retroactive Dates**), and that Conference **Item 357-2, Indication of Additional Constituent Values**, should be made an item for development. The Sector's Technical Advisor and the NTEP laboratory representative were asked to develop a proposal for addressing the moisture basis issue for consideration by the Sector at or before its August 2000 meeting. The goal being to forward a recommendation on 357-2 to the S&T Committee for consideration at their January 2001 meeting.

6. Review of EPOs and Test Procedures for the field evaluation of Near Infrared Grain Analyzers

Background: At the March 1998 GMM/NIR Sector meetings a working group was established to develop Examination Procedure Outlines (EPOs) and Field Evaluation Test Procedures for GMM and NIR devices to provide guidance to States on implementing NIST HB 44 as it applied to these devices. Templates were developed to assist the working group with their assignments in documenting the EPOs and field evaluation test procedures. The working group was divided into the 3 teams:

Team 1 - EPO XXX for Grain Moisture Meters and NIST HB 44 Recommended Field Evaluation Test Procedures for Grain Moisture Meters, Whole Grain Sample Method.

Team 2 - EPO XXX for Near Infrared Grain Analyzers and Appendix A of EPO XXX, "NIST HB 44 Recommended Field Evaluation Test Procedures for Near Infrared Analyzers.

Team 3 - Appendix B, Alternative Field Evaluation Test Procedures for Grain Moisture Meters, Meter to Meter Method.

Discussion: Diane Lee, NIST-OWM, explained that EPOs are intended to be check lists which follow NIST HB 44 requirements. Test Procedures, on the other hand, should include specific procedures which must be followed to perform field evaluations (procedures for preparing samples may be included, as appropriate).
Commenting on the Draft EPO for NIR Grain Analyzers, the Sector noted:

1. Several of the items in the check list are specifications which can be verified only during NTEP conformance testing.
2. The retroactive dates have been removed from the Tentative Code. It would be helpful if the EPO provided some suggestions on which portions of the code should be applied to pre-NTEP devices.

The Test Procedure was not available for review, but the Sector noted:

1. The test protocol developed for the NIR Tentative Code Study (see Item 6, this Summary) contains the essential information needed for the Test Procedure.
2. When the Test Procedure is developed, it should be edited to be consistent with the Test Procedures for GMMs.

Conclusion: Because of time limitations, and recognizing that major editing might be involved in a line-by-line review of each EPO and Test Procedure, the NIST representative was asked to edit the EPO and Test Procedure to incorporate the Sector's suggestions. Electronic copies of the edited documents will be sent to Sector members for review and comment by November 15, 1999.

Attendance List
National Type Evaluation Technical Committee
Grain Moisture Meters and NIR Grain Analyzers Sectors
September 8 - 10, 1999 St. Louis, MO

Name & Affiliation	Internet E-Mail Address	September		
		8	9	10
Jack Barber, JB Associates	jbarber@cityscape.net	X	X	X
Connie Brown, DICKEY-john Corp.	cbrown@dickey-john.com	X	X	X
Randy Burns, Arkansas Bureau of Standards	BurnsR@aspb.state.ar.us	X	X	X
Sidney Colbrook, Illinois Dept. of Agriculture	scolbrook@agr.state.il.us	X	X	X
Bob Davis, Illinois Department of Agriculture	bdavis@agr.state.il.us	X	X	X
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Andrew Gell, Foss North America	agell@fossnorthamerica.com	X	X	X
Rich Flaugh, GSF Inc.	richf@gsfinc.com	X	X	X
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Joe Rothleder, California Dept. of Food & Ag.	JRothleder@cdfa.ca.gov	X	X	X
Jacqueline Russell, Perten Instruments	JRussell@perten.com	X	X	X
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Cliff Watson, Consultant		X	X	X
Robert Wittenburger, Missouri Dept. of Agriculture	bwittenb@mail.state.mo.us	X	X	X
Richard Wotthlie, State of Maryland	wotthlrw@mda.state.md.us	X	X	X
David Funk, GIPSA	dfunk@tsd.fgiskc.usda.gov	X	X	X